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ABSTRACT

Utilizing a computerized model, this paper presents a five-year financial plan for the board of education in North York (Ontario). The model assumes that the present organizational structure and policies of the board will continue and that a zero inflation rate will prevail for the next five years. It assesses financial implications for the future under stable as well as changing circumstances. The factor most likely to affect financial planning is that of declining enrollment, which necessitates consequent reductions in teaching staff, supply and equipment, support services, and provincial grants. The model's strength comes from its ability to consider "what if" questions and to determine the impact of a particular course of action compared to the status quo. The limitations of the model are its representation of approximate conditions rather than actual dollar savings or costs, and its assumption of specific interrelationships of major variables that may not be compatible with all financial operations. The paper lists the types of information required for use of the model. (Author/WD)

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NORTH YORK BOARD OF EDUCATION

RESEARCH REPORT

ED199894

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FUTURES RESEARCH: FINANCIAL PLANNING

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October, 1978

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FUTURES RESEARCH: FINANCIAL PLANNING

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PREFACE

This report is the outcome of co-operative activities between three organizations - a Board of Education, a University and the Ministry of Education.

As a result of the Board's concern for the future, early in 1978 their Finance Department developed a five-year financial plan in the form of a model. Development of the plan involved the input and manipulation of considerable amounts of data, all of which was undertaken through hand-calculations. As a result of discussions of the model with both Ministry officials and a university professor, interested in futures research and familiar with computerized modeling techniques, at least two advantages in computerizing the model were identified, (1) it would facilitate replication of the model by other Boards across the Province, and (2) alternative future scenarios could be generated with far greater ease, i.e. input factors could be varied and the computer could quickly and easily generate the resulting different outcomes.

Realizing the potential of such research, the Ministry contracted with the Board to develop and computerize their financial model.

One has some optimism for the future, when it is realized that once the decision to proceed was made, participants in this novel, sophisticated and cooperative project were sufficiently adaptable to ensure its completion within three months.

PURPOSE

> "When men perceive that uncertainty lies ahead, their concern with the future increases proportionately. Therefore it is inevitable that more of the future be taken into account, but it is only through thoughtful study of forecasts and forecast tools that it can be taken into account reasonably."

Educational policy and practice are influenced by a variety of factors and events, both internal and external. The organization of a school system, the talents of its professional staff and the characteristics of the student population are a few of the more important internal factors. External forces include government legislation, demographic changes, economic policy concerning local and provincial spending, employment opportunities, and changing social attitudes. As social, economic, and political changes accelerate, so does the pressure exerted upon our educational system to meet this change in a meaningful manner.

As society changes and educators decide how the school system should respond, there is an increased need for relevant information. In the past, many educational innovations have produced some short term gains but have failed to provide basic improvements. This is often the case when change is the response to a crisis. While crisis situations will continue to exist and educators may have to adopt "stop-gap" measures from time to time, we must start anticipating change in an effort to meet future challenges.

It has often been said that planning is the key to success. While success is not something on which a firm guarantee can be given, the benefits of planning for the future

cannot be denied. An organization which takes a system-wide, long-term view of development will be in a better position to make rational decisions concerning the problems and issues with which it will be faced.

The next five-year period will be one of the most challenging in the history of education in Ontario. It will be influenced significantly by the economic environment, decreasing student enrolments, reduced Provincial Government support for education and the unprecedented number of students graduating. Within this framework, financial decisions will be made which will have implications for the education system for years to come.

The purpose of this paper is to provide a first step in the development of a method or methods to facilitate the process of rational decision-making. Although the focus is on financial planning, it must not be overlooked that this is only one segment of overall coroporate planning.

THE MODEL

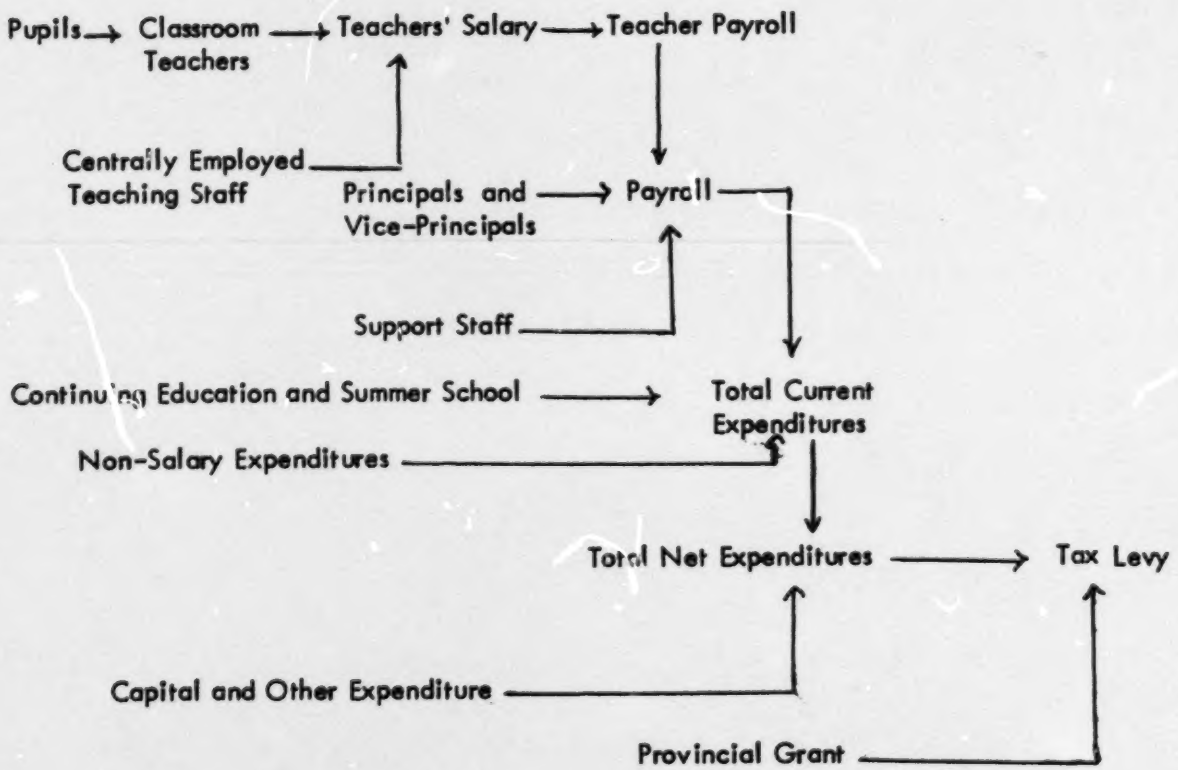
The approach taken in this paper is to present a five-year financial plan in the form of a computerized model. A model is simply a representation of reality which allows us to abstract and consider a part of the system in isolation and then test the effect on the whole system. The use of a model facilitates providing answers to the "what-if" types of questions often posed by decision-makers, e.g. What are the financial implications if we decrease the teacher-pupil ratio by .5? When the "what-if" types of questions are asked, the individual components in the model can be changed, to reflect the questions asked, and the results determined, i.e. a simulation technique. The computerization of the model expedites the tasks of calculating and simulating parameters so that the impact

of proposed financial policies may be evaluated relatively quickly.

The model presented in this paper, as depicted diagrammatically in Figure 1, provides a representation of a particular board of education, the Board of Education for the Borough of North York. The model was developed on the basis of a number of assumptions, a key one being that the present organizational structure and policies of the Board will continue for the next five years.

In the description which follows, each component of the model is outlined and the underlying assumptions noted to help the reader both understand the model as well as enable him to reach a decision as to the potential usefulness of the model for his board.

FIGURE 1



Description of Model's Components

Pupils

The Honourable Thomas Wells, Minister of Education, in an address given at the 1978 inaugural meeting of the Etobicoke Board of Education, stated that the elementary school enrolment across the Province will have dropped by approximately 212,000 in the ten year period ending in 1981. Furthermore, secondary school enrolment is projected to peak this year, 1978, and will start declining until 1985 - 86 at which point the secondary school system will have shrunk by almost one-fifth of its present size.

In the borough of North York, total enrolment peaked in 1972 at 106,000, and has since declined to 86,252 in September 1978. A further decrease of some 30,000 is expected by 1987, causing the overall enrolment to be reduced by 45% in 15 years.*

While these statistics reveal the magnitude of the decline, the model focuses on the resulting financial impact during the next five years. In other words, what would happen in financial terms during the years 1978 - 82, if the present organization and policies of the Board of Education continue and the only changes are those which would occur automatically as a result of decreasing student enrolment?

Teachers

The decline in pupil enrolment has forced school boards to decrease staff and services that are immediately dependent on pupil enrolment. A critical mechanism in the model

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* Lusk, K.R. A Five-Year Financial Planning Model. Board of Education for the Borough of North York, Finance Department, February, 1978.

is the process by which the number of teacher positions required each year is monitored and by implication the number of positions to be reduced in view of the decline in enrolment.

The number of teaching positions available is determined according to the pupil-teacher ratio, a formula adopted as contractual policy by the board. The model compares the actual number of teachers with the indicated number of positions consistent with the pupil-teacher ratio for each year. The discrepancy between these numbers represents the number of teachers which must be hired or as is more likely in view of declining enrolments, the number of teachers which must be layed off. When the number of teaching staff must be reduced, two basic factors are considered in making decisions about which staff will be involved, the number of years of teaching experience and academic qualifications. These factors are used to construct grids for each panel, elementary, junior high and secondary school, which have 21 rows indicating the number of years of experience ("experience steps") and varying numbers of columns representing qualification categories. For example, the grid for the elementary panel has seven columns, while the secondary school grid has four, corresponding to the respective categories of qualification of teachers in these panels. The grids are dynamic rather than static structures, i.e., as a teacher completes a year of teaching, he or she moves to the next step on the grid, if it is below the maximum years of experience for their category. Correspondingly, teachers may improve their academic qualifications and so move to a higher qualification category on the grid.

The model allows the user to indicate:

- the percentage of teachers in the lower qualification categories who are improving their qualifications,
- the percentage of teachers in the higher qualification categories who are improving their qualifications,

- the percentage of teachers who leave the board each year, i.e. the attrition rate.

The computer will provide a print-out of each grid indicating for a given year the number of teachers in the board in each subgroup. For example, Tables 1 and 2 illustrate the distribution of teachers in elementary schools in North York for the years 1978 and that projected for 1982. In examining the tables, the reader will note the shift both down and across towards the bottom right section of the grids during the five-year period. These two trends occur at the junior high and secondary panels as well.

Centrally-Employed Teaching Staff

These staff members provide support to teachers and students in the area of curriculum and student services on a system-wide basis and are not distinguished from teachers in the classroom for the purposes of the model. This component was treated as being fixed as it was assumed that the North York Board's current organization and structure will continue.

Teachers' Salaries

Using the grids, the model assigns salaries to each respective group of teachers at the various levels of experience and qualification. It is assumed that salaries are increased annually during the first ten years of teaching as the number of years of experience increases, and secondly that salaries may be increased for the attainment of a higher qualification rank. It is assumed further that there will be a zero inflation rate over the next five years, therefore there will be no overall salary increase. The model allows the user to examine the financial impact of introducing different percentage salary increases.

In addition, teachers' benefits and responsibility allowances are treated as a separate item, distinct from teachers' salary.

Teachers' Payroll*

* The teachers' salary and payroll components are sufficiently complex that a submodel and its possible uses are described in a later section of the paper under "Utilization of the Model".

ELEMENTARY SCHOOL
TEACHER DISTRIBUTION IN TERMS OF FULL TIME EQUIVALENTS BY CATEGORY/STEP
1978

STEPS	I	II	III	IV	V	VI	VII	TOTAL
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	5.9	49.1	15.5	25.2	95.7
4	5.6	7.7	2.1	7.3	31.2	6.6	7.6	68.1
5	3.7	8.6	6.6	17.0	31.2	11.9	10.1	89.2
6	9.8	7.0	16.6	14.9	34.6	17.1	13.2	113.2
7	17.7	20.9	18.2	17.7	34.8	13.2	5.4	127.9
8	17.2	26.0	18.0	13.3	39.7	15.4	11.0	140.6
9	14.0	31.0	24.4	7.7	24.1	15.2	10.5	126.9
10	11.6	34.6	34.3	8.3	26.8	19.4	12.0	147.0
11	12.1	32.7	20.5	9.1	16.8	17.1	10.7	119.1
12	12.6	16.0	25.9	9.2	17.2	11.4	9.1	101.4
13	7.4	21.3	15.1	4.2	12.3	14.5	7.5	82.3
14	6.1	12.9	19.1	5.0	10.6	15.2	7.6	76.4
15	0.9	16.3	14.9	4.1	14.1	11.6	8.1	70.1
16	1.9	11.3	19.9	2.0	8.1	8.8	4.9	56.8
17	0.9	9.4	10.1	1.9	3.7	9.2	12.8	48.0
18	0.9	10.3	10.2	2.8	3.8	13.6	9.4	51.0
19	2.8	5.7	6.4	2.4	9.9	8.1	2.9	38.2
20 +	4.7	51.0	69.4	18.4	21.2	42.3	37.0	244.0
TOTAL	129.9	322.6	331.9	151.1	389.5	266.1	205.0	1796.0

TABLE 2

ELEMENTARY SCHOOL
TEACHER DISTRIBUTION IN TERMS OF FULL TIME EQUIVALENTS BY CATEGORY/STEP
1982

STEPS	I	II	III	IV	V	VI	VII	TOTAL
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	3.3	24.6	19.7	20.4	68.1
11	13.3	18.4	14.1	15.8	26.6	17.7	12.1	118.0
12	12.9	22.1	14.6	13.3	28.5	20.0	18.3	129.7
13	10.5	25.4	19.1	11.6	18.2	15.8	16.5	117.1
14	8.7	27.7	25.5	14.4	20.5	19.2	19.4	135.6
15	9.1	26.4	16.9	11.6	13.8	15.3	16.8	109.8
16	9.4	13.9	18.0	12.4	14.3	12.0	13.5	93.6
17	5.6	17.1	12.1	6.9	9.5	12.2	12.5	75.9
18	4.5	10.6	13.4	8.1	8.9	12.3	12.7	70.5
19	0.7	12.4	11.2	6.6	10.5	10.8	12.3	64.6
20 +	8.4	67.5	82.0	47.6	42.6	64.0	91.9	404.1
TOTAL	83.2	241.5	226.7	151.7	218.1	219.2	246.5	1386.9

Having assigned salaries to teachers according to their experience and qualifications, the model then calculates the teachers' payroll by multiplying the number of teachers in each group by the salary, and then sums the results over each panel.

Tables 3 and 4 show the financial effect of the current policy of staff reduction (i.e. laying off junior teachers) at the elementary level. The senior teachers with more than 20 years of experience make up only 15% of the elementary teachers' salary budget in 1978 but by 1982, this subgroup of teachers will account for 30% of the budget. This same pattern is evident at both the junior high and secondary school panels.

Continuing Education and Summer School

The level of continuing education and summer school activities, expressed in terms of student hours is assumed to remain the same over the five-year period. As these items are not related to student enrolment, their costs are entered as a constant in the model.

Principals and Vice-Principals

In keeping with the assumption that the Board's current organization and policies will continue to 1982, one principal is assigned to each school and the number of principals remains constant in the model.

The number of vice-principals in North York, however, is determined by a formula related to enrolment which has been adopted as Board policy (see Appendix A); therefore, the number of vice-principals is not constant but will decrease as the pupil enrolment decreases.

Support Staff

This group includes a large number of services classified here as "in-school" and "out-of-school" and is essentially all employees who are not included in staff allocation.

The in-school group includes secretarial and clerical personnel, teachers' aides, audio-visual

TABLE 3

ELEMENTARY SCHOOL
PAYROLL PER CATEGORY/STEP GROUP AS A PERCENTAGE OF THE TOTAL PAYROLL BUDGET
1978

STEPS	I	II	III	IV	V	VI	VII	TOTAL
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.3	2.2	0.8	1.3	4.6
4	0.2	0.3	0.1	0.3	1.5	0.4	0.4	3.2
5	0.1	0.3	0.3	0.8	1.6	0.7	0.6	4.4
6	0.4	0.3	0.7	0.8	1.8	1.0	0.8	5.8
7	0.8	0.9	0.9	0.9	1.9	0.8	0.3	6.6
8	0.7	1.2	0.9	0.7	2.3	1.0	0.7	7.6
9	0.6	1.5	1.3	0.4	1.5	1.0	0.7	7.0
10	0.5	1.7	1.9	0.5	1.7	1.4	0.9	8.5
11	0.5	1.6	1.1	0.5	1.1	1.2	0.8	6.8
12	0.5	0.8	1.4	0.6	1.1	0.8	0.7	5.8
13	0.3	1.0	0.8	0.2	0.8	1.0	0.6	4.8
14	0.3	0.6	1.0	0.3	0.7	1.1	0.6	4.5
15	0.0	0.8	0.8	0.2	0.9	0.8	0.6	4.2
16	0.1	0.5	1.1	0.1	0.5	0.6	0.4	3.3
17	0.0	0.5	0.5	0.1	0.2	0.6	0.9	3.0
18	0.0	0.5	0.6	0.2	0.2	1.0	0.7	3.1
19	0.1	0.3	0.3	0.1	0.6	0.6	0.2	2.3
20+	0.2	2.5	3.7	1.1	1.3	3.0	2.7	14.6
TOTAL	5.5	15.3	17.4	8.3	21.8	17.6	14.0	100.0

TABLE 4

ELEMENTARY SCHOOL
PAYROLL PER CATEGORY/STEP GROUP AS A PERCENTAGE OF THE TOTAL PAYROLL BUDGET
1982

STEPS	I	II	III	IV	V	VI	VII	TOTAL
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.2	1.8	1.6	1.7	5.4
11	0.7	1.1	0.9	1.1	2.0	1.4	1.0	8.3
12	0.7	1.3	1.0	1.0	2.1	1.6	1.6	9.3
13	0.6	1.5	1.3	0.8	1.3	1.3	1.4	8.2
14	0.5	1.7	1.7	1.0	1.5	1.6	1.7	0.6
15	0.5	1.6	1.1	0.8	1.0	1.2	1.4	7.7
16	0.5	0.8	1.2	0.9	1.1	1.0	1.2	6.6
17	0.3	1.0	0.8	0.5	0.7	1.0	1.1	5.4
18	0.3	0.6	0.9	0.6	0.7	1.0	1.1	5.1
19	0.0	0.8	0.7	0.5	0.8	0.9	1.1	4.7
20 +	0.5	4.1	5.4	3.4	3.2	5.2	7.8	29.6
TOTAL	4.6	14.6	14.9	10.9	16.2	17.9	21.0	100.0

technicians, caretakers, matrons, substitute teachers, and per diem para-professionals. The number of staff in these groups is not determined by a formula related to enrolment and therefore their number remains constant in the model.

The out-of-school group includes the employees of the administrative office of the board and other workers who serve the system as a whole. Their number is assumed to be constant in the model.

Payroll

This is the sum of the teachers', principals', vice-principals' and support staff salaries. For the purposes of the model, principals and support staff salaries were taken as a constant using the 1978 amount. Although vice-principals' salaries are also a constant, the vice-principal payroll will decrease as the number of vice-principals decrease.

Non-Salary Expenditures

Non-salary items include travel, personnel training, classroom and administrative supplies and expenses, supplies and expenses for the operation of board facilities and vehicles, fees and services, and program development. The level of expenditure for some of these items varies with student enrolment, while the expenditure level of others does not. For example, the allocation of classroom supplies to schools is governed by several formulae related to enrolment. Other supplies and expenses, however, such as building repairs, telephone costs, care-taking supplies, and energy costs, are more related to the maintenance of facilities and do not change significantly if the number of facilities remains constant. Finally, non-salary expenditures for out-of-school personnel budgeted centrally were assumed to be, in the aggregate, constant over the next five years. Although some of these expenditures may be expended in support of teachers and students in the classroom, they tend to relate mainly to the existence of a central organizational unit rather than the number of teachers and students that unit serves.

Total Current Expenditures

These expenditures are a summation of Payroll, Continuing Education and Summer School, and Non-Salary Expenditures.

Capital and Other Expenditures

Capital items include replacement and additional furniture and equipment, permanent improvements, debenture debt charges on sites and buildings and a portion of capital charges from current funds which are normally carried in the composite current budget of the board. With the exception of replacement and additional equipment in schools, capital charges are related to the existence of administrative school facilities rather than to student enrolments. There are certain other items pertaining to the operation of a school board which would be included in the annual budget of the board if it was a divisional board of education under the Education Act. These include estimated tax deficiencies and supplementary tax revenues, temporary financing charges, a reserve for self-insurance and any surpluses or deficits from the prior year . It is assumed that there will not be a surplus or deficit carried forward in any year from 1979 to 1982. It is also assumed that capital expenditures from current funds and permanent improvements will remain relatively constant during the next five years.

Total Net Expenditures

Total net expenditures, reduced by pupil transportation costs and adjusted for non-resident students, correspond generally to the definition of ordinary expenditures for grant purposes. The actual level of ordinary expenditures per pupil at which a board operates is important in terms of the overall level of Provincial grant support which a board of education receives. In the model, the Total Net Expenditure is the sum of Total Current Expenditures plus Capital and Other Expenditures.

Provincial Grants

Provincial grants provide a source of financing for boards of education. Grants are based on weighted ceiling expenditures per pupil. As pupil enrolments decline, the amount of provincial grant support will therefore decline. No consideration is given in the allotment of grants to fixed or semi-fixed expenditures. It is assumed in the model that the present provisions of the general legislative grants will remain the same during the next five years. It should be noted, however, that although the basic grant ceiling reflects the change in teacher qualifications and experience each year, for the purposes of the model, these changes have been ignored.

Taxes

The second source of financing for boards of education is local property taxation. All per pupil expenditures in excess of the weighted ceilings are financed 100% from local tax revenues.

Computer Printout of Basic Model

The previous discussion has described each of the components in the model. The following table (Table 5) illustrates the printout the computer will provide of the components in the basic model and their projected values for the five year period 1978 - 1982. The following are key points to note in the table:

- the last column of the table gives the percentage change in the parameters for the indicated variables,
- the pupils and teachers are tabulated for the three panels - elementary, junior and senior high,
- the salaries of the teachers, principals, vice-principals and support staff are added to the expenditures for continuing education and non-salary items to give Total Current Expenditures - to this, Capital Expenditures are then added to give the Total Net Expenditures,

TABLE 5
BASIC FINANCIAL MODEL

NORTH YORK BOARD OF EDUCATION	1978	1979	1980	1981	1982	% CHANGE
ELEMENTARY						
ENROLMENT (F.T.E.)	36241.	34172.	32201.	30360.	28587.	-21.12
TEACHERS #	1796.	1685.	1580.	1482.	1387.	-22.78
TEACHERS $	38578075.	37346077.	35910328.	34301811.	32484314.	-15.80
JUNIOR HIGH						
ENROLMENT (F.T.E.)	18171.	16522.	15044.	14181.	13805.	-24.03
TEACHERS #	971.	877.	793.	743.	722.	-25.68
TEACHERS $	23719861.	22198682.	20564550.	19486380.	19034789.	-19.75
SECONDARY						
ENROLMENT (F.T.E.)	29061.	28358.	27199.	25372.	23386.	-19.53
TEACHERS #	1647.	1606.	1538.	1430.	1314.	-20.26
TEACHERS $	42298694.	42100345.	41181395.	39131654.	36454108.	-13.82
TOTAL $	104071972.	103416019.	100049571.	95761701.	90941191.	-12.62
PRINCIPALS $	6149500.	6187400.	6183200.	6180400.	6181200.	0.52
VICE PRINCIPALS $	3218400.	3140000.	3078200.	3030500.	2933800.	-8.84
TOTAL STAFF ALLOCATION $	113439872.	112753419.	109310971.	104972601.	100056191.	-11.80
SUPPORT STAFF $	39654200.	39587900.	39537900.	39401100.	39294700.	-0.91
CONTINUING EDUCATION $	1991100.	1992400.	1993100.	1993100.	1993100.	0.10
NON SALARY EXPENDITURES $	18562900.	18517000.	18218500.	17987600.	17718800.	-4.55
TOTAL CURRENT EXPENDITURES $	173648072.	172840719.	169060471.	164354401.	159062791.	-8.40
TOTAL CAPITAL EXPENDITURES $	12401800.	13259400.	13125200.	13090000.	13056400.	5.28
TOTAL NET EXPENDITURES $	186049872.	186100119.	182185671.	177444401.	172119191.	-7.49
COST/PUPIL ELEMENTARY $	1912.	2051.	2141.	2210.	2260.	18.19
COST/PUPIL SECONDARY $	2485.	2536.	2595.	2688.	2790.	12.26
GRANT REVENUE $	54655401.	47036751.	38202629.	29130507.	20412000.	-62.65
TAX LEVY $	131394471.	139063368.	143983042.	148313895.	151707191.	15.46
RESIDENTIAL MILL RATE	78.1244	81.9749	84.0345	85.6215	86.5972	10.85

BASIC FINANCIAL MODEL

- from this, the cost/pupil is calculated for the elementary (including the junior) and secondary panels,

- the grant revenue is presented as calculated by the board - the difference between the Total Net Expenditures and the Grant Revenue is the Tax Levy, from which the Residential Mill Rate is computed.

UTILIZATION OF THE MODEL

The diagram and printout of the basic model and the elaboration of the various components may have raised several questions in the mind of the reader. For example:

- how has the model been used in North York? How can we use it?
- what are its limitations?
- what information does a board require in order to use the model?

North York Utilization of the Model

In North York, the model was used to inform Trustees and senior administrative staff of financial implications for the future,

(1) if, with the exception of enrolment the existing system remains relatively the same during the next five years and,

(2) if certain changes were to occur.

In terms of a picture of the existing system five years hence, the first step was to make a long term enrolment forecast (see Table 6 and Figure 2). It was then assumed, as pointed out earlier, that the only changes will be those which occur automatically as a result of the forecasted declining enrolment, e.g. reductions in teaching staff based on the existing pupil-teacher ratio, and corresponding reductions in in-school supply and equipment allocations, some support services staff and grants from the Provincial Government; in other words, items which are governed by some existing formulae, both intrinsic and extraneous to the board. When costs were projected to 1982 (see Table 7) using 1978 dollar figures as a base, one of the most significant outcomes was that although student enrolments and teaching staff allocation will have declined 21% by 1982, the net expenditures of the system will be reduced by only 7%. Recall further that one of the assumptions of the model is a zero inflation rate during the next five years. A major factor determining this discrepancy is the projected costs for honouring current commitments for teacher contracts. Regardless of any salary increases negotiated in the coming years, two factors, annual increments and qualification improvements, will offset, in part, any cost reductions resulting from a decrease in teaching staff based on juniority. In North York, according to the present salary grids, by 1982 all elementary and junior high teachers will be at their maximum salary level for each category with at least 10 years of teaching experience. This has two important implications. First, any teaching staff reductions by juniority in years subsequent to 1982 will affect teachers who have a considerable number of years of experience. Secondly, cost increases arising from increments will cease by 1983.

TABLE 6

THE BOARD OF EDUCATION FOR THE BOROUGH OF NORTH YORK

TEN YEAR ENROLMENT FORECAST

1977 - 1987

	1972	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Elementary (Junior Kindergarten to Grade 6)	56,817	43,128	40,531	38,272	36,155	34,160	32,387	31,225	30,706	30,498	30,506	30,628
Junior High School (Grades 7 to 9)	21,827	19,506	18,171	16,522	15,044	14,181	13,305	13,164	12,185	10,977	10,078	9,568
Secondary (Grades 9 to 13)	27,513	29,604	29,361	28,758	27,499	25,672	23,686	21,973	20,751	20,037	19,014	17,810
TOTAL	106,157	92,238	88,063	83,552	78,698	74,013	69,878	66,362	63,642	61,512	59,598	58,006

FIGURE 2

ENROLMENT IN NORTH YORK SCHOOLS

1968 - 1987

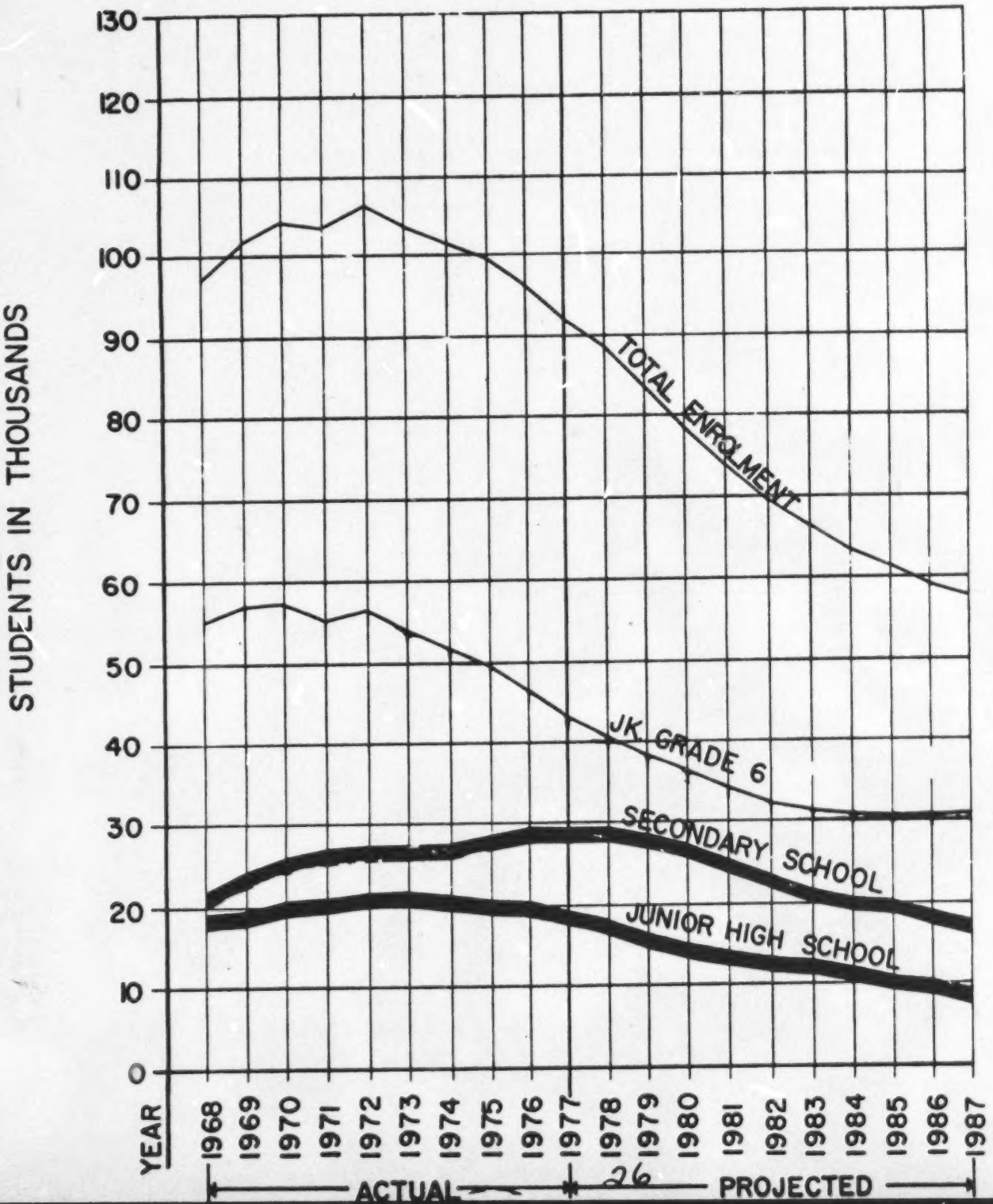


TABLE 7

THE BOARD OF EDUCATION FOR THE BOROUGH OF NORTH YORK

FINANCIAL POSITION
FOR THE YEARS 1978 TO 1982 *

		1978	1979	1980	1981	1982	% Change 1978 to 1982 Increase (Decrease)
Enrolment (F.T.E.)	#	83,473	79,052	74,444	69,913	65,778	(21.2%)
Staff Allocation: Sept. 1	#	4,677.5	4,433.5	4,177.0	3,921.5	3,687.0	(21.2%)
	$	115,876.0	114,711.4	111,620.1	107,649.0	103,095.9	(11.0%)
Support Staff: (F.T.E.)	#	2,113.3	2,106.6	2,100.9	2,096.1	2,093.3	(0.9%)
Total	$	39,654.2	39,587.9	39,537.9	39,401.1	39,294.7	(0.9%)
Continuing Education & Summer School: (F.T.E)	#	13.5	13.5	13.5	13.5	13.5	-
	$	1,991.1	1,992.4	1,993.1	1,993.1	1,993.1	0.1%
Non-Salary Expenditures	$	18,562.9	18,517.0	18,218.5	17,978.6	17,718.8	(4.5%)
Total Current Expenditures	$	176,084.2	174,808.7	171,369.6	167,021.8	162,102.5	(7.9%)
Capital & Other Expenditures	$	12,401.8	13,259.4	13,125.2	13,090.0	13,056.4	5.3%
Total Net Expenditures	$	188,486.0	188,068.1	184,494.8	180,111.8	175,158.9	(7.1%)
Grant Revenue	$	52,131.3	44,429.5	35,422.5	26,120.2	17,136.3	(67.1%)
Tax Levy	$	136,354.7	143,638.6	149,072.3	153,991.6	158,022.6	15.9%

* In 1,000s of dollars

This is a picture of the existing system if it remains unchanged, however, it is unlikely that this will be the case. The most powerful aspect of the model is the opportunity it provides to the decision-makers to pose "what-if" types of questions, determine the financial impact of taking a particular course of action and then compare these results with those of a status quo situation. The user has the option of varying each of several components one at a time or simultaneously and the model will determine the financial outcome. For example, in developing the model, several simulations were carried out using North York data and their outcomes are depicted in Tables 8 - 13.

Simulation 1: Table 8 is obtained by postulating that there has been a salary increase of 6% for the teaching staff, principals, vice-principals,and support staff, an increase of 10% in non-salary and capital expenditures and 5% in the provincial grant ceiling. In other words, several components have been varied simultaneously. The effect of these changes can be seen in the rise of Cost per Pupil, the Tax Levy and the Residential Mill Rate.

The simulation was carried out by inserting the numerical values of the increases in the "growth card", the first card of the data deck. Other simulations based on any other increases would be carried out by inserting them on a card to replace this one.

Simulation 2: Here the pupil-teacher ratio was lowered by 0.5 in all three panels. This change was introduced in conjunction with those carried out in Simulation 1. The results show a further rise in the Cost per Pupil, Tax Levy and the Residential Mill Rate (Table 9)

This simulation was carried out by inserting the changes in PTR on the three PTR cards.

NORTH YORK BOARD OF EDUCATION	1978	1979	1980	1981	1982	% CHANGE
ELEMENTARY						
ENROLMENT (F.T.E.)	36241.	34172.	32201.	30360.	28587.	-21.12
TEACHERS #	1796.	1685.	1580.	1482.	1387.	-22.78
TEACHERS $	40892760.	41962052.	42769775.	43305246.	43471340.	6.31
JUNIOR HIGH						
ENROLMENT (F.T.E.)	18171.	16522.	15044.	14181.	13805.	-24.03
TEACHERS #	971.	877.	793.	743.	722.	-25.68
TEACHERS $	25143052.	24962439.	24492708.	24601105.	25472842.	1.31
SECONDARY						
ENROLMENT (F.T.E.)	29061.	28358.	27199.	25372.	23386.	-19.53
TEACHERS #	1647.	1606.	1538.	1430.	1314.	-20.26
TEACHERS $	44336615.	47303947.	49047701.	49402812.	48783819.	8.80
TOTAL $	106582291.	112206832.	115049136.	116709775.	117476698.	10.22
PRINCIPALS $	6518470.	6952163.	7364290.	7802613.	8271840.	26.90
VICE PRINCIPALS $	3411504.	3528104.	3666185.	3825936.	3926086.	15.08
TOTAL STAFF ALLOCATION $	116512265.	122687098.	126079611.	128338324.	129674624.	11.30
SUPPORT STAFF $	42033452.	44480964.	47090272.	49742981.	52585173.	25.10
CONTINUING EDUCATION $	2110566.	2238661.	2373814.	2516243.	2667217.	26.37
NON SALARY EXPENDITURES $	20419190.	22405570.	24248823.	26335645.	28536305.	39.75
TOTAL CURRENT EXPENDITURES $	181075473.	191812293.	199792520.	206933193.	213463319.	17.89
TOTAL CAPITAL EXPENDITURES $	13641980.	16043874.	17469641.	19165069.	21027463.	54.14
TOTAL NET EXPENDITURES $	194717453.	207856167.	217262162.	226098262.	234490782.	20.43
COST/PUPIL ELEMENTARY $	2002.	2291.	2554.	2816.	3079.	53.85
COST/PUPIL SECONDARY $	2601.	2832.	3095.	3425.	3801.	46.13
GRANT REVENUE $	61884604.	6.204648.	58841035.	55712953.	52491540.	-15.18
TAX LEVY $	137832849.	146651519.	158421127.	170385309.	181999242.	37.01
RESIDENTIAL MILL RATE	78.9830	86.4598	92.4792	98.3844	103.9112	31.56

SIMULATIONS

. INCREASE OF 4% IN ALL SALARIES, 10% IN NON-SALARY AND CAPITAL EXPENDITURE, AND 5% IN THE PROVINCIAL GRANT CEILING.

TABLE 80

NORTH YORK BOARD OF EDUCATION	1978	1979	1980	1981	1982	% CHANGE
ELEMENTARY						
ENROLMENT (F.T.E.)	36241.	34172.	32201.	30360.	28587.	-21.12
TEACHERS #	1796.	1736.	1677.	1623.	1520.	-15.36
TEACHERS $	40892760.	43036667.	45108508.	47080251.	47484452.	16.12
JUNIOR HIGH						
ENROLMENT (F.T.E.)	18171.	16522.	15044.	14181.	13805.	-24.03
TEACHERS #	971.	905.	845.	819.	796.	-18.07
TEACHERS $	25143052.	25569511.	25873753.	26944195.	27977696.	11.27
SECONDARY						
ENROLMENT (F.T.E.)	29061.	28358.	27199.	25372.	23386.	-19.53
TEACHERS #	1647.	1657.	1638.	1575.	1447.	-12.13
TEACHERS $	44836615.	47959274.	50900819.	53181986.	53188369.	18.63
TOTAL $	106582291.	113161637.	118710503.	124012421.	127784066.	19.89
PRINCIPALS $	6518470.	6952163.	7364290.	7802613.	8271840.	26.90
VICE PRINCIPALS $	3411504.	3528104.	3666185.	3825936.	3926086.	15.08
TOTAL STAFF ALLOCATION $	116512265.	123641904.	129740979.	135640970.	139981992.	20.14
SUPPORT STAFF $	42033452.	44480964.	47090272.	49742981.	52585173.	25.10
CONTINUING EDUCATION $	2110566.	2238661.	2373814.	2516243.	2667217.	26.37
NON SALARY EXPENDITURES $	20419190.	22405570.	24248823.	26335645.	28536305.	39.75
TOTAL CURRENT EXPENDITURES $	181075473.	192767099.	203453898.	214235839.	223770687.	23.58
TOTAL CAPITAL EXPENDITURES $	13641980.	16043874.	17469641.	19165069.	21027463.	54.14
TOTAL NET EXPENDITURES $	194717453.	208810973.	220923529.	233400908.	244798150.	25.72
COST/PUPIL ELEMENTARY $	2002.	2301.	2597.	2907.	3215.	60.61
COST/PUPIL SECONDARY $	2601.	2845.	3147.	3535.	3968.	52.55
GRANT REVENUE $	61884604.	71204648.	58841035.	55712953.	52491540.	-15.18
TAX LEVY $	132832849.	147606325.	162082494.	177687955.	192306610.	44.77
RESIDENTIAL MILL RATE	78.9830	87.0210	94.6085	102.5866	109.7802	38.99

SIMULATIONS ON THE BASIC FINANCIAL MODEL

TABLE 9

1. INCREASE OF 4% IN ALL SALARIES, 10% IN NON-SALARY AND CAPITAL EXPENDITURE, AND 5% IN THE PROVINCIAL GRANT CEILING.

2. A POPULATION DECLINE RATE OF 5.7% IN THE FIRST YEAR, AND 0.5% LESS IN EACH FOLLOWING YEAR.

Simulation 3: Table 10 is based on altering the PTR's by lowering them to whatever value might be necessary to retain all the teachers. This was done by calculating the PTR's accordingly, and inserting the indicated changes in their values on the PTR cards for the three panels, respectively. The results show the rise in Cost per Pupil, Tax Levy and Residential Mill Rate.

Simulations 4 - 6: By way of exploring methods of introducing current issues as simulations, an assumption was made that Non-Salary and Capital Expenditures might have to sustain an increase of 10% due to the decline in the Canadian dollar. This increase was supposed to occur over and above the previous 10% that was simulated previously, and also included in the present run.

To carry out this simulation, the values of these items were increased by 10% on the indicated cards in the data deck, while the present cards that were used for the basic model were removed. The results are shown in Table 11. Tables 12 and 13 show simulations of three scenarios, namely, salary and capital expenditure increases, PTR reductions and decline in currency.

The simulations were carried out in order to demonstrate the potential use of the model to serve as a policy evaluator in decision-making.

Utilization of Teacher Submodel

As stated earlier, the teacher salary and payroll component is sufficiently complex that a submodel was built to show the parameters of the teachers' grid explicitly. The submodel can be run independently to show the distribution of teachers year by year and panel by panel, resulting from the adjustments necessitated by declining pupil enrolment and the application of a policy of layoff by juniority. The reader will recall that the grids

NORTH YORK BOARD OF EDUCATION	1978	1979	1980	1981	1982	% CHANGE
ELEMENTARY						
ENROLMENT (F.T.E.)	36241.	34172.	32201.	30360.	28587.	-21.12
TEACHERS #	1796.	1796.	1842.	1796.	1796.	-0.01
TEACHERS $	40892760.	43972307.	47744473.	50477610.	53848695.	31.68
JUNIOR HIGH						
ENROLMENT (F.T.E.)	18171.	16522.	15044.	14181.	13805.	-24.03
TEACHERS #	971.	971.	971.	971.	971.	-0.04
TEACHERS $	25143052.	26842026.	28617891.	30458751.	32369622.	28.74
SECONDARY						
ENROLMENT (F.T.E.)	29061.	28358.	27199.	25372.	23386.	-19.53
TEACHERS #	1647.	1647.	1646.	1647.	1648.	0.00
TEACHERS $	44836615.	47875727.	51000898.	54215197.	57512078.	28.27
TOTAL $	106582291.	113999481.	122159341.	130478580.	138583093.	30.02
PRINCIPALS $	6518470.	6952163.	7364290.	7802613.	8271840.	26.90
VICE PRINCIPALS $	3411504.	3528104.	3666185.	3825936.	3926086.	15.08
TOTAL STAFF ALLOCATION $	116512265.	124479747.	133189816.	142107129.	150781019.	29.41
SUPPORT STAFF $	42033452.	44480964.	47090272.	49742981.	52585173.	25.10
CONTINUING EDUCATION $	2110566.	2238661.	2373614.	2516243.	2667217.	26.37
NON SALARY EXPENDITURES $	20419190.	22405570.	24148823.	26335645.	28536305.	39.75
TOTAL CURRENT EXPENDITURES $	181075473.	193604942.	206902725.	220781998.	234569713.	29.54
TOTAL CAPITAL EXPENDITURES $	13641980.	16043874.	17469641.	19165069.	21027443.	54.14
TOTAL NET EXPENDITURES $	194717453.	209648816.	224372367.	239867067.	255597176.	31.27
COST/PUPIL ELEMENTARY $	2002.	2311.	2637.	2987.	3357.	67.70
COST/PUPIL SECONDARY $	2601.	2857.	3196.	3633.	4143.	59.28
GRANT REVENUE $	61884604.	61204648.	58841035.	55712953.	52491540.	-15.18
TAX LEVY $	132832849.	148444169.	165531332.	184154114.	203105636.	52.90
RESIDENTIAL MILL RATE	78.9830	87.5135	96.6142	106.3075	115.9297	46.78

SIMULATIONS OF THE BASIC FINANCIAL MODEL

1. INCREASE IN ALL SALARIES, BUT NO NON-SALARY AND CAPITAL EXPENDITURE, AND NO PUPIL MOVEMENT BETWEEN.

TABLE 10

2. INCREASE IN NUMBER OF TEACHERS IN HIGH SCHOOL BY 12

ELEMENTARY						
ENROLMENT (F.T.E.)	36241.	34172.	32201.	30360.	28587.	-21.12
TEACHERS #	1796.	1685.	1580.	1482.	1387.	-22.78
TEACHERS $	40892760.	41962052.	42769775.	43305246.	43471340.	6.31
JUNIOR HIGH						
ENROLMENT (F.T.E.)	18171.	16522.	15044.	14181.	13805.	-24.03
TEACHERS #	971.	877.	793.	743.	722.	-25.68
TEACHERS $	25143052.	24942439.	24492708.	24601105.	25472842.	1.31
SECONDARY						
ENROLMENT (F.T.E.)	29061.	28358.	27199.	25372.	23386.	-19.53
TEACHERS #	1647.	1606.	1538.	1430.	1314.	-20.26
TEACHERS $	44836615.	47303947.	49047701.	49402812.	48783819.	8.80
TOTAL $	106582291.	112206832.	115049136.	116709775.	117476698.	10.22
PRINCIPALS $	6518470.	6952163.	7364290.	7802613.	8271840.	26.90
VICE PRINCIPALS $	3411504.	3528104.	3666185.	3825936.	3926086.	15.08
TOTAL STAFF ALLOCATION $	116512265.	122687098.	126079611.	128338324.	129674624.	11.30
SUPPORT STAFF $	42033452.	44480964.	47090272.	49742981.	52585173.	25.10
CONTINUING EDUCATION $	2110566.	2238661.	2373814.	2516243.	2667217.	26.37
NON SALARY EXPENDITURES $	22440000.	24684000.	26620000.	29062385.	31646521.	41.03
TOTAL CURRENT EXPENDITURES $	183096283.	194090723.	202163697.	209659933.	216573536.	18.28
TOTAL CAPITAL EXPENDITURES $	14960000.	17666000.	19299500.	21083040.	23110818.	54.48
TOTAL NET EXPENDITURES $	198056283.	211756723.	221463197.	230742973.	239684354.	21.02
COST/PUPIL ELEMENTARY $	2036.	2334.	2603.	2873.	3148.	54.61
COST/PUPIL SECONDARY $	2645.	2886.	3155.	3495.	3885.	46.85
GRANT REVENUE $	61884604.	61204648.	58841035.	55712953.	52491540.	-15.18
TAX LEVY $	136171679.	150552075.	162622162.	175030020.	187192814.	37.47
RESIDENTIAL MILL RATE	80.9664	88.7524	94.9223	101.0571	106.8684	31.99

BASIC FINANCIAL MODEL

SIMULATIONS

1. INCREASE IF 6% IN ALL SALARIES, 10% IN NON-SALARY AND CAPITAL EXPENDITURE, AND 5% IN THE PROVINCIAL GRANT CEILING.

2. ASSUME THAT THE DROP IN THE CANADIAN $ ADDS A 10% INCREASE TO NON-SALARY AND CAPITAL EXPENDITURES

TABLE 11

ELEMENTARY						
ENROLMENT (F.T.E.)	36241.	34172.	32201.	30360.	28587.	-21.12
TEACHERS #	1796.	1736.	1677.	1623.	1520.	-15.36
TEACHERS $	40892760.	43036667.	45108508.	47080751.	47484452.	16.12
JUNIOR HIGH						
ENROLMENT (F.T.E.)	18171.	16522.	15044.	14181.	13805.	-24.03
TEACHERS #	971.	905.	845.	819.	796.	-18.07
TEACHERS $	25143052.	25569511.	25873753.	26944195.	27977696.	11.27
SECONDARY						
ENROLMENT (F.T.E.)	29061.	28358.	27199.	25372.	23386.	-19.53
TEACHERS #	1647.	1657.	1638.	1575.	1447.	-12.18
TEACHERS $	44836615.	47089274.	50900819.	53181986.	53188369.	18.63
TOTAL $	106582291.	113161637.	118710503.	124012421.	127784065.	19.89
PRINCIPALS $	6518470.	6952163.	7364290.	7802613.	8271840.	26.90
VICE PRINCIPALS $	3411504.	3528104.	3666185.	3425936.	3926086.	15.08
TOTAL STAFF ALLOCATION $	116512265.	123641904.	129740979.	135640870.	139981992.	20.14
SUPPORT STAFF $	42033452.	44480964.	47090272.	49742981.	52585173.	25.1
CONTINUING EDUCATION $	2110566.	2238661.	2373814.	2516243.	2667217.	26.3
NON SALARY EXPENDITURES $	22440000.	24684000.	26620000.	29062385.	31646521.	41.0
TOTAL CURRENT EXPENDITURES $	183096283.	195045529.	205825064.	216962579.	226880904.	23.9
TOTAL CAPITAL EXPENDITURES $	14960000.	17666000.	19209500.	21083040.	23110818.	54.4
TOTAL NET EXPENDITURES $	198056283.	212711529.	225124554.	238045619.	249991722.	26.2
COST/PUPIL ELEMENTARY $	2036.	2344.	2646.	2964.	3283.	61.2
COST/PUPIL SECONDARY $	2645.	2899.	3207.	3606.	4052.	53.1
GRANT REVENUE $	61884604.	61204648.	58841035.	55712953.	52491540.	-15.1
TAX LEVY $	136171479.	151506881.	166283529.	182332666.	197500182.	45.0
RESIDENTIAL MILL RATE	80.9644	89.3136	97.0516	105.2594	112.7375	39.2

SIMULATIONS ON THE BASIC FINANCIAL MODEL

1. INCREASE OF 6% IN ALL SALARIES, 10% IN NON-SALARY AND CAPITAL EXPENDITURE, AND 5% IN THE PROVINCIAL GRANT CEILING.

2. A PUPIL-TO-TEACHERS RATIO OF 18.71 IN THE FIRST YEAR, AND 0.50 LESS IN EACH OF THE NEXT 4 YEARS.

3. SECOND COST PUPIL RATIO IN EXPENDITURES $ ALONG A 10% INCREASE IN NON-SALARY AND CAPITAL EXPENDITURES.

TABLE 12

YORK BOARD OF EDUCATION	1978	1979	1980	1981	1982	% CHANGE
ELEMENTARY						
ENROLMENT (F.T.E.)	38241.	34172.	32291.	30360.	28587.	-21.12
TEACHERS #	1796.	1796.	1842.	1796.	1796.	-0.01
TEACHERS $	40892760.	43972307.	47744473.	50477610.	53848695.	31.68
JUNIOR HIGH						
ENROLMENT (F.T.E.)	18171.	16522.	15044.	14181.	13805.	-24.03
TEACHERS #	971.	971.	971.	971.	971.	-0.04
TEACHERS $	25143052.	26842026.	28617891.	30458751.	32369622.	28.74
SECONDARY						
ENROLMENT (F.T.E.)	29061.	28358.	27199.	25372.	23386.	-19.53
TEACHERS #	1647.	1647.	1646.	1647.	1648.	0.00
TEACHERS $	44936615.	47875727.	51000898.	54215197.	57512078.	28.27
TOTAL $	106582291.	113999481.	122159341.	130478580.	138583093.	30.02
PRINCIPALS $	6518470.	6952163.	7364290.	7802613.	8271840.	26.90
VICE PRINCIPALS $	3411504.	3529104.	3666185.	3825936.	3926086.	15.08
TOTAL STAFF ALLOCATION $	116512265.	124479747.	133189816.	142107129.	150781019.	29.41
SUPPORT STAFF $	42033452.	44480964.	47090272.	49742981.	52585173.	25.10
CONTINUING EDUCATION $	2110566.	2238661.	2373814.	2516243.	2667217.	26.37
NON SALARY EXPENDITURES $	22440000.	24694000.	26620000.	29062385.	31646521.	41.03
TOTAL CURRENT EXPENDITURES $	183096283.	195983372.	209273932.	223428738.	237679930.	29.81
TOTAL CAPITAL EXPENDITURES $	14960000.	17666000.	19299500.	21083040.	23110818.	54.48
TOTAL NET EXPENDITURES $	198056283.	213549372.	228573432.	244511778.	260790749.	31.68
COST/PUPIL ELEMENTARY $	2036.	2354.	2697.	3045.	3425.	68.22
COST/PUPIL SECONDARY $	2645.	2910.	3256.	3704.	4227.	59.78
GRANT REVENUE $	61884604.	61204649.	58941035.	55712953.	52491540.	-15.18
TAX LEVY $	136171679.	152344724.	169732967.	188798825.	208299209.	52.97
RESIDENTIAL MILL RATE	80.9684	89.8061	99.0574	109.9803	118.8865	46.83

SIMULATIONS ON THE BASIC FINANCIAL MODEL

1. INFLATION IS AS IN ALL SALARIES, 10% IN NON-SALARY AND CAPITAL EXPENDITURES, AND 5% IN THE PROVINCIAL GRANT CEILING.

TABLE 13

2. ASSUME THAT THE GROWTH IN THE EXPANSION % ADDS A 10% INCREASE TO NON-SALARY AND CAPITAL EXPENDITURES

-28-

3. [illegible] 36

show the numbers of teachers in each of the years of experience and at the various levels of qualification as well as the percentage of the payroll budget allocated to the various groups of teachers in the first and last year of a five year study. The teachers' submodel may also be used for simulation of various policies for the adjustment of the number of teachers' positions, for example changing pupil-teacher ratio, as well as the granting of salary and cost-of-living increases.

In the early stages of this work, an aggregated model was constructed as a pilot project to establish causal relations and to verify that certain trends manifest themselves. For this purpose, a computer language called DYNAMO was used to serve as a guide to the construction of the more detailed basic model in order to take advantage of the graphing capability of the Dynamo language.

The teachers' sector of the Dynamo model is essentially the same as in the basic model which is written in the computer language, Fortran. It uses the pupil-teacher ratio to determine the number of teachers' positions that will be available in any given year and to adjust the number of teachers accordingly by adherence to a seniority policy. The following graphs (Figures 3 - 5) illustrate the type of print-out which can be obtained when using the Dynamo submodel.

Figure 3 shows the change in the numbers of teachers with 0 to 9 years experience as of 1978. The graphs are printed by the computer by using the digits 0,1,2,....9 to show the numbers of teachers with 0,1,2...9 years of experience in the five years ending in 1982. It is obvious from the graph that teachers with less than 6 years experience are removed from the system more or less completely by 1982. Teachers with 7,8, and 9 years experience respectively, are greatly reduced in number.

FIGURE 3: DISTRIBUTION OF TEACHERS WITH 0 - 9 YEARS OF EXPERIENCE
DURING THE FIVE YEAR PERIOD FROM 1978 -1982

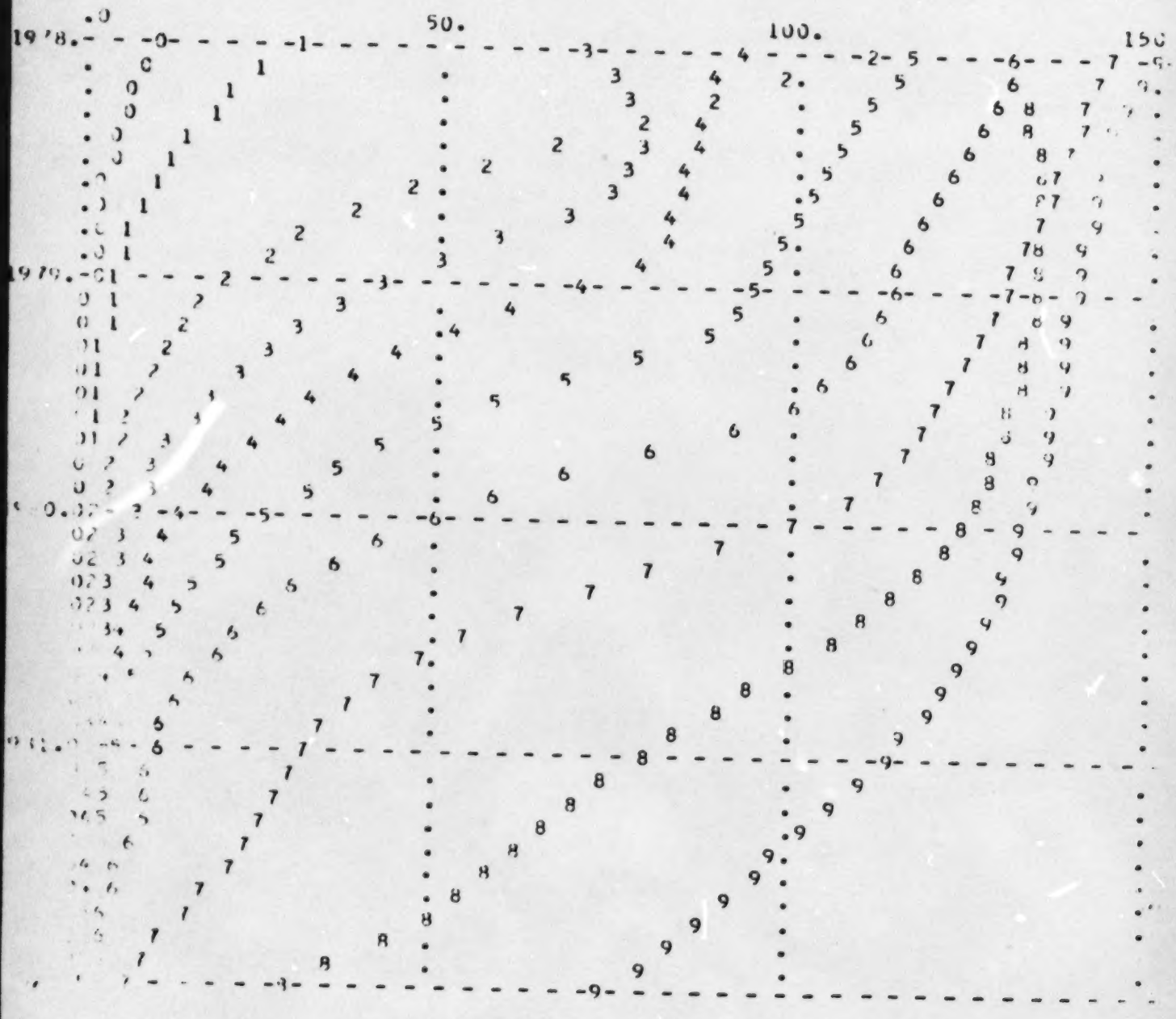


Figure 4 shows the change in the numbers of teachers with 10 to 19 years of experience as of 1978. Now the digits 0,1,2...9 print the graphs for the numbers of teachers with 10,11....19 years of experience for the five years from 1978 to 1982. The only group showing a decline is that with 10 years experience. However, the decline is less than any shown in Figure 3. The graphs for the groups with 11 and more years of experience rise to show increasing numbers of teachers with advanced experience. The highest rise of all is shown by the group with 20 or more years of experience in Figure 5.

The graphs shown in the three figures refer to the teachers as a single group. Teachers were not disaggregated into panels in the Dynamo model as was done later in the Basic Model. The data needed to run the teachers' submodel are described in the Technical Supplement.

Limitations of the Model

There are two obvious limitations to the model. First, the reader is reminded that the model represents only an approximation of reality and that utilization of the model will give only directions or trends - not actual dollar savings or costs. This will probably be most limiting for boards within metropolitan Toronto because of their particular financial structure. The model assumes that the North York Board is an autonomous divisional board of education, although in fact it is not.

Secondly, the model assumes that the components shown in Figure 1 (page 3) are the major variables and that they have an interrelationship as depicted. It is possible that some board may think of the financial component of their operation in a way which is incompatible with the model.

FIGURE 4: DISTRIBUTION OF TEACHERS WITH 10 - 19 YEARS OF EXPERIENCE DURING THE FIVE YEAR PERIOD FROM 1978 - 1982

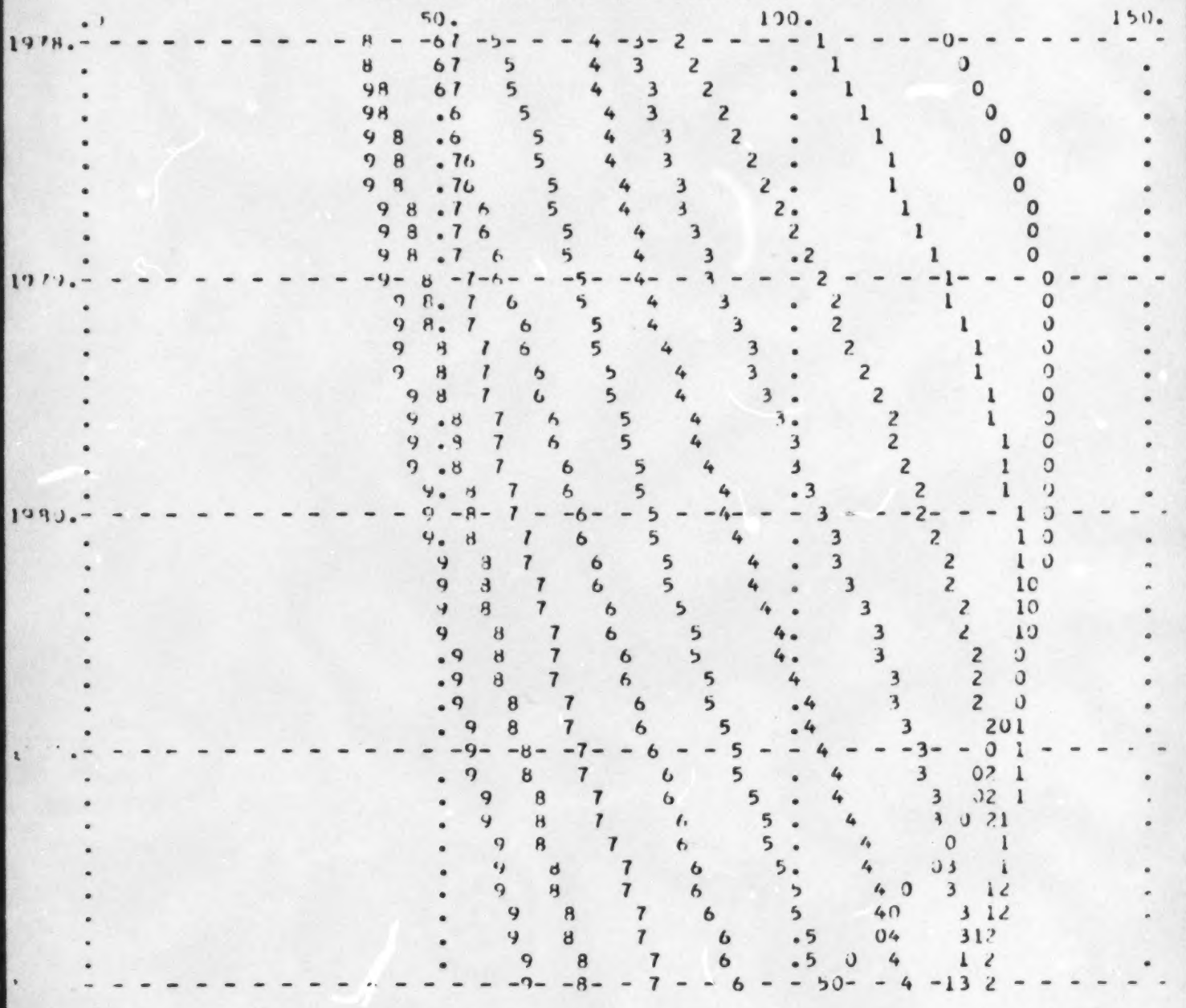
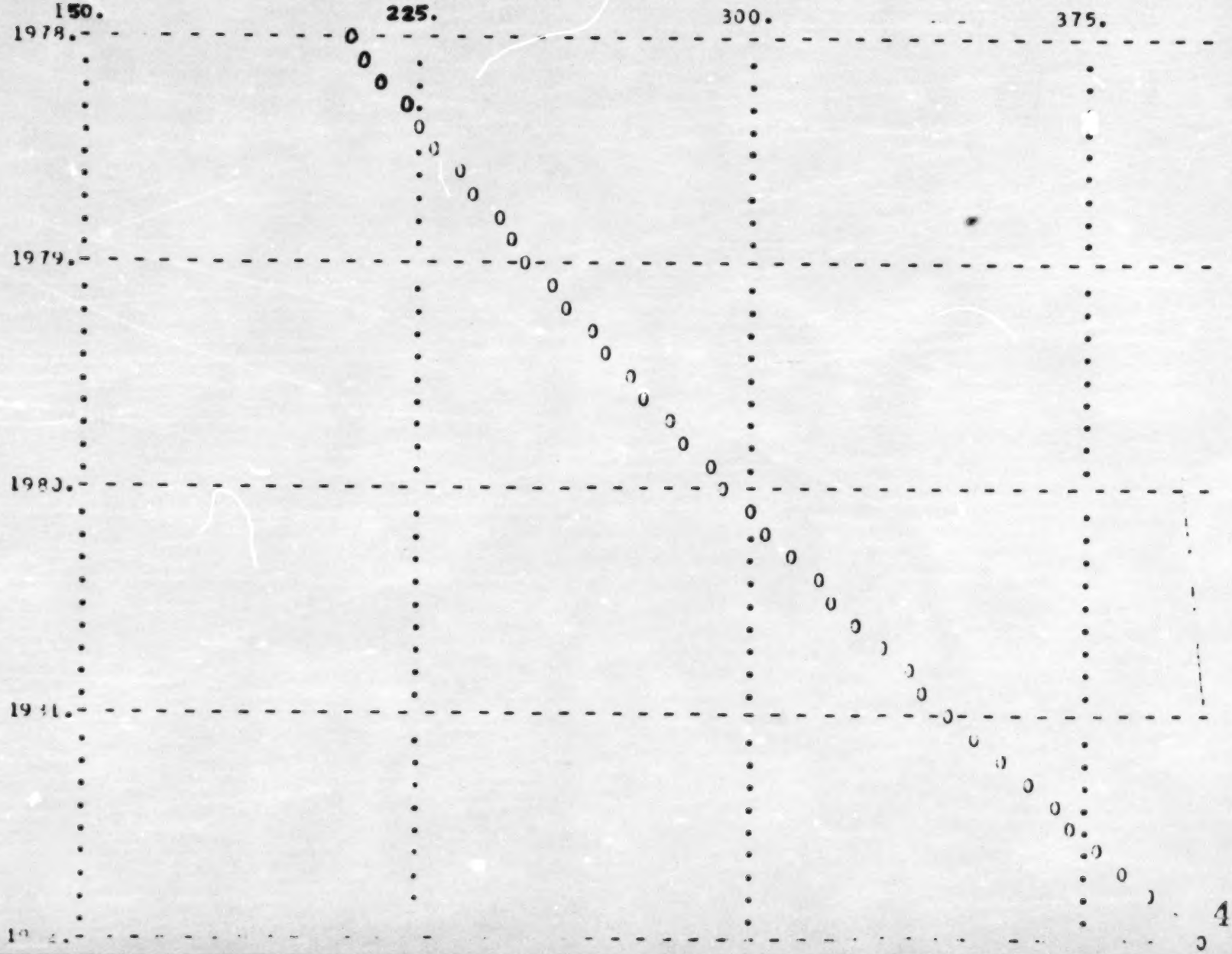


FIGURE 5 DISTRIBUTION OF TEACHERS WITH 20 YEARS OR MORE OF EXPERIENCE
DURING THE FIVE YEAR PERIOD 1978 - 1982



Information Required to Use the Model

If an individual board feels that the assumptions on which the model was based are sufficiently compatible with their organization and policies and decides to use the model, the financial officer will find it necessary to do some preparatory work. The majority of the information required to input in the model is likely available in each board and needs to be gathered by the financial officer, e.g.

- enrolment projections for the next five years,
- teacher distribution by category for each of the elementary and secondary panels along with corresponding salary grids,
- history of teacher's category changes so that a percentage figure can be input representing the percentage of teachers who improve their qualifications each year and the percentage of teachers who resign and/or retire each year. Such historical information may not be readily available in some boards and they will have to make their estimates of these figures based only on the previous year's figures,
- all non-salary data, e.g.utilities, equipment, etc. are input directly for the five year period with any changes reflecting a percentage increase over the five years,
- debenture Amortization Schedule,
- Assessment data,

It is estimated that gathering and compiling this information will require the equivalent of approximately one week of the financial officer's time.

After procuring the program deck, (available at cost from the authors), standard

computer cards need to be completed in the manner described in the technical supplement. These cards are grouped under 30 major headings and are listed in the technical supplement along with a description of what information is required fron the board and how it is to be entered on each card. Once completed, the data cards are placed at the back of the program deck and can be run on any computer which has a fortran compiler and a storage capacity of 64,000 bytes. The form of the output is also discussed in the technical supplement.

Pers. 1

ALLOCATION OF VICE-PRINCIPALS

The following is the allocation of vice-principals to Secondary, Junior High and Elementary Schools.

Secondary Schools

Designated Composite Schools shall be allocated two vice-principals and a third vice-principal when the student enrolment is above 1600.

Schools not designated Composite Schools shall be allocated one vice-principal when the enrolment is below 1400 students; two vice-principals when the enrolment is above 1400 students, and three vice-principals when the enrolment is above 1800 students.

Junior High Schools

Junior High Schools shall be allocated one vice-principal.

Elementary Schools

For the school year 1977/78, the criteria for the appointment of vice-principals in elementary schools shall be based on an optimum pupil enrolment of 550. Two vice-principals shall be allocated when the enrolment is above 1000 students.

Ranges of population shall be established for the retention of vice-principals in elementary schools when the school population is declining.

Board Minute 65/1970, 52/1971, 205/1977